The Opportunity to Achieve Net Zero Emissions in Indonesia Through Green Economy Implementation to Address Climate Change

Aulia Sabila Syarifa Qalbie; Rahmaniah
10.22146/globalsouth.86381

International Relations
Universitas Muhammadiyah Yogyakarta, Indonesia
auliasabilasq18@gmail.com

This research discusses Indonesia's potential and challenges in implementing a green economy to achieve net zero emissions and address climate change. Global climate change poses a significant challenge to many countries, including Indonesia. To tackle this issue, implementing a green economy has been acknowledged as a practical approach to achieve substantial emission reductions and promote sustainable development. This research explores the potential of implementing a green economy in Indonesia to attain zero emissions and effectively address climate change. This research adopts a qualitative approach, utilizing a literature review, policy analysis, and case studies of green economy implementation in crucial sectors of the Indonesian economy. The analysis reveals that Indonesia possesses immense potential to adopt a green economy. However, several challenges hinder Indonesia's successful implementation of a green economy. This research provides valuable insights into Indonesia's potential, challenges, and efforts to achieve net zero Emissions. The Indonesian government has engaged in several collaborative partnerships involving various ministries of the Republic of Indonesia, domestic stakeholders, and international actors.

Keywords: *climate change; green economics; Indonesia; net zero emission*

Introduction

The issue of climate change has become a global focus, from shifting weather patterns that threaten food production to rising sea levels that increase the risk of catastrophic flooding and other disasters that threaten the lives of living things. The impact of climate change has a global scope and an unprecedented scale, so it has become an international focus. With drastic action today, adapting to those impacts in the future will be more accessible and more affordable (United Nations, 2015). Indonesia, along with the international community, is actively collaborating to achieve the goal of reducing global temperatures following the Paris Agreement. The agreement, established at the Conference of the Parties (COP-21) in Paris, encourages countries to limit the maximum global temperature increase to 2°C above pre-industrial levels, with further efforts to strive for a limit of 1.5°C (Badan Riset dan Inovasi Nasional,

2022).

As one of the countries committed to the Paris Agreement, Indonesia has taken steps to address the threat of climate change caused by greenhouse gas (GHG) emissions. This is shown in Indonesia's ratification of the Paris Agreement through Law No. 16 of 2016 and the elaboration of actions in the Enhanced Nationally Determined Contribution (ENDC) document. In the ENDC, Indonesia targets a reduction in greenhouse gas emissions of 31.89% through national efforts, with a potential reduction of up to 43.20% with international assistance by 2030 (Kemenkeu RI, 2022).

Indonesia's commitment was further strengthened at COP-26 in Glasgow on October 31 - November 12, 2021, by setting the target of achieving Net-Zero Emissions by 2060 or earlier (Institute for Essential Services Reform (IESR), 2021). Following COP-26, Indonesia submitted a long-term draft to the UNFCCC titled "Indonesia Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR)." This document outlines Indonesia's climate change targets and plans until 2050, including reaching peak GHG emissions in 2030 and achieving Net-Zero Emissions by 2060 or earlier (waste4change, 2022).

Net-zero emissions refers to a state where the amount of carbon emissions released into the atmosphere does not exceed the amount that can be absorbed by the Earth (waste4change, 2022). Transitioning from the current energy system to a clean one is necessary to achieve this goal. Therefore, a balance between human activities and the natural environment can be pursued.

On the other hand, the COVID-19 pandemic that hit in early 2020 caused widespread economic disruptions worldwide due to social and economic restrictions implemented to control the spread of the virus. COVID-19 has significantly impacted the economies of several countries, including Indonesia. The Indonesian economy contracted 2.07 percent (year-on-year) in 2020 compared to 2019 (Badan Pusat Statistik, 2021). The economic setback caused by the COVID-19 pandemic has prompted the government to maximize economic activities to improve the welfare of the people, reduce poverty, create more jobs, and revive a declining economy.

The importance of economic growth and the challenges of climate change put Indonesia in a dilemma. On the one hand, Indonesia possesses abundant natural resources and significant economic sectors, such as agriculture, plantations, mining, and energy. Sustainable economic growth in these sectors is crucial for reducing poverty, improving the welfare of society, and achieving economic development. However, on the other hand, Indonesia is also highly vulnerable to significant climate change impacts, such as flooding in several regions of Indonesia, decreased rainfall in several areas, increasing air temperature, and rising seawater (Julismin, 2013). Indonesia is at risk due to rising sea levels, changes in weather patterns, ecosystem damage, and decreased biodiversity.

Climate change can potentially disrupt food production, harm infrastructure, jeopardize the sustainability of natural re-

sources, and negatively impact public health and welfare. The dilemma between economic growth and environmental conservation is an interconnected challenge that cannot be resolved independently. Therefore, there is a need for a financial system that can effectively balance the objectives of economic development and environmental preservation (Skha, 2022).

The current economic system must solve major societal and environmental problems (Fiscal Policy Office, 2009). The Indonesian government regards the green economy as an alternative vision for growth and development to improve people's lives consistent with sustainable development. The green economy promotes a more sustainable, low-carbon economy (Skha, 2022). The green economy is vital to long-term economic transformation (Dianjaya & Epira, 2020). The green economy is also a focus of the government's policies to support inclusive and sustainable economic development in the country (Limanseto, 2022).

If the implementation of the green economy in Indonesia can be carried out properly, it will contribute to reducing greenhouse gas emissions, conserving natural resources, and transitioning to renewable energy. The Indonesian government has planned the Low Carbon Development Initiative to realize the green economy. The Low Carbon Development Initiative aims to explicitly incorporate environmental considerations, such as greenhouse gas reduction targets and carrying capacity, into the framework of development planning (Daryono, 2022a).

Based on the background above, the research question is, "What are the opportunities and the challenges for Indonesia to successfully implement a green economy in achieving Net Zero emissions to address climate change?" This research aims to analyze the opportunities available to identify the potential and strategies that can be used to significantly reduce greenhouse gas emissions and achieve the net zero emissions target in Indonesia, to determine the challenges and barriers in implementing a green economy in Indonesia, to identify the factors that hinder the transition from conventional economy to a green economy, including policies, regulations, technology, human resources, and social and cultural aspects and to provide insights into the challenges that need to be addressed for successful implementation.

Literature Review

Indonesia is a country rich in natural resources, but it also faces significant environmental degradation. Environmental degradation is a condition where the quality of the environment decreases due to the damage that has occurred and reduces the function of the ecological components as they should (Arifah, 2022). Indonesia is faced with environmental degradation caused by humans, such as deforestation, over-exploitation of natural resources, and pollution from industries and motor vehicles, which then drive domino impacts such as disasters in the form of landslides, floods, droughts, erosion, animal deaths, loss of people's livelihoods and those caused by nature such as tsunamis, earthquakes, and volcanic eruptions. These activities will cause severe, widespread,

and possibly irreversible changes to people, assets, economies, and ecosystems worldwide and even have implications for climate change (European Commission, 2022). Climate change has become a prominent issue widely discussed recently, as its impacts are felt in various aspects of human life. Climate change has several consequences, such as rising temperatures, changing rainfall patterns, and other adverse effects (Julismin, 2013).

According to Aprilianto & Ariefianto (2021), climate change that has attracted global attention brings up the concept of the Net Zero Emissions (NZE) program since the signing of the Paris Climate Agreement in 2015. The program aims to reduce environmental pollution that can cause climate change. Indonesia also needs to start preparing its Long-Term Development Plan (RPJP), aligning it with its plan to achieve NZE, ideally by around 2060 or earlier (Indonesia Research Institution Decarbonization, 2022).

Based on UNEP (2013), As per the UNEP's operational definition, a green economy is characterized by enhancing human well-being and social fairness alongside substantially reducing environmental hazards and scarcities in the ecosystem. This explanation has been employed to create and evaluate different investment scenarios through economic models and applied policy analysis within the GER. Despite a compelling economic rationale for investing in environmentally friendly trade, many significant challenges persist. These challenges predominantly stem from constraints in financial and human resources, inadequate regulatory structures, deficient implementation and enforcement mechanisms, and insufficient economic infrastructure. Obstacles like illiteracy and limited access to energy hinder sustainable and certified trade advancement. These concerns necessitate focused endeavors at the global, regional, national, and local levels to be effectively addressed (UNEP, 2013)

Based on the research by Khor (2013), the "green economy" is not a concept that has yet to enjoy widespread agreement (among economists or environmentalists) or an international consensus. It is a highly complex concept, and there is unlikely to be a consensus on its meaning, usefulness, and policy implications in the short term. In implementing a green economy, developing countries face many challenges and obstacles in moving their economies to more environmentally friendly paths. On the one hand, this should ensure the attempt to urgently incorporate environmental elements into economic development. On the other hand, the various obstacles should be identified and recognized, and international cooperation measures should be taken to enable and support sustainable development efforts (Khor, 2013)

Based on research by Maran (2017), the green economy enables the realization of sustainable development. Various approaches exist for enacting a more green economy. Initiatives have been initiated in numerous nations towards adopting a green economy. This progress is positive, yet obstacles endure. The ultimate goal of the greener economy is to attain sustainable development. However, the green economy encounters numerous

challenges. Among these, finance and technology pose the most significant challenges. Both national economic policies and global strategies experience difficulties, especially during global financial crises (Maran, 2017).

Based on the study by Dianjaya and Epira (2020), UNEP proposes a new concept to combat global warming and climate change through economic activities known as the "Green Economy." Indonesia embraces this opportunity by incorporating green economy principles into its national policies (Dianjaya & Epira, 2020). The federal constitution and the 2020-2024 development plan have included the transition to a green economy. However, the research by Martawardana et al. (2022) suggests that economic recovery programs still need to address environmental issues, indicating a need for more consistency between planning and implementation despite the ongoing pandemic. The country's economy relies heavily on extractive sectors and primary commodities that negatively impact the environment. The opportunities to strengthen the green economy, including substantial government stimulus, have yet to be fully utilized.

Methodology

The methodology used in this research is a qualitative approach with a literature study. This approach is employed to gather data by analyzing relevant literature about the opportunities for achieving net-zero emissions in Indonesia through implementing a green economy in response to climate change.

Indonesia is one of the developed countries trying to implement a green economy (Kemenkeu RI, 2022). The qualitative approach and literature study utilized include scholarly journals, books, research reports, public policies, and other information sources, allowing for in-depth and precise studies on implementing a green economy, efforts to reduce emissions in Indonesia, and their impact on climate change. All literature used in this study will be adequately cited and referenced. The sources used will be listed in the reference list to maintain the integrity and accuracy of the research.

Discussion

Indonesia's Potential to Implement a Green Economy

A green economy, also known as a sustainable economy or environmentally friendly economy, is an economic approach that focuses on sustainable economic growth and environmental consciousness. The concept of a green economy acknowledges that economic activities and human well-being must be balanced with protecting and restoring the natural environment (Yulianti, 2015). Essentially, a green economy aims to achieve sustainable development by considering three interconnected dimensions: the economy, the environment, and society (Ferzi, 2021).

Indonesia is a country that has the potential to implement a green economy, considering that Indonesia is a country whose economy is heavily supported by a wealth of natural resources (Yusuf, 2021). Energy, mining, agriculture, and forestry are prom-

ising commodities for Indonesia's economic growth. Unfortunately, economic growth in Indonesia is not always accompanied by alleviating social and environmental problems. Natural resources, especially forests, are often in danger of being depleted because they are used to support the economy.

In this context, applying green economy principles emerges as a potential solution to balance Indonesia's sustainable economic growth, environmental protection, and social aspects (Kalimasada, 2022). As a country with a large population, vast territory, abundant natural resources, and significant environmental challenges, Indonesia has excellent opportunities to develop a sustainable and environmentally friendly economy. Indonesia has natural resources and various economic sectors that can be directed to support environmentally friendly economic growth, which include:

1. Renewable Energy

   The potential of renewable energy in Indonesia can be one of the main pillars in supporting the implementation of a green economy. Indonesia has abundant natural resources, such as sunlight, wind, water, biomass, and geothermal heat, which can be utilized as renewable energy sources.

   Renewable energy can reduce dependence on fossil fuels, contributing to greenhouse gas emissions. In addition, it also has positive impacts on the economy and the environment. Some potential applications of renewable energy in Indonesia include:

   - Solar Energy

Indonesia has abundant sunlight throughout the year, making it an ideal location for solar energy development. Solar energy can be used in various sectors, such as solar power plants, solar water heaters, and street lighting. According to the Ministry of Energy and Mineral Resources (ESDM) in press release number 303. Pers/04/SJI/2021, Indonesia has a solar energy potential of 200,000 Megawatts (MW) (Direktorat Jenderal EBTKE, 2021). However, the current solar energy utilization is only around 150 MW, approximately 0.08% of its potential (Laily, 2022).

- Wind Energy

Wind energy in Indonesia has tremendous potential to be developed as a renewable energy source. According to research conducted by the National Institute of Aeronautics and Space (LAPAN), out of 166 studied locations, there are 35 locations with excellent wind potential, with wind speeds above 5 meters per second at a height of 50 meters (Sekretariat Kabinet RI, 2017). Some regions with good wind speeds include West Nusa Tenggara (NTB), East Nusa Tenggara (NTT), the south coast of Java, and the south coast of Sulawesi. Additionally, LAPAN has identified 34 locations with sufficient wind speeds ranging from 4 to 5 meters per second. Indonesia has significant wind energy potential (Sekretariat Kabinet RI, 2017). As reported in the Energy Outlook of

Indonesia 2022 released by the National Energy Council (DEN), Indonesia has a wind energy potential of up to 154.9 gigawatts (GW) (Dewan Energi Nasional, 2022). According to DEN's Handbook of Energy & Economic Statistics of Indonesia 2021, wind energy is considered a renewable, abundant, widely distributed, and clean energy alternative (Dewan Energi Nasional, 2022). Using wind energy through wind power plants (PLTB) does not generate greenhouse gas emissions during operation and requires minimal land use. Wind energy can be harnessed to generate electricity through wind power plants (PLTB) (Pristiadaru, 2023).

- Water Energy

Indonesia has numerous rivers and a significant potential for water resources that can be utilized for hydropower generation. The development of Hydropower Plants (PLTA) can reduce reliance on fossil fuels to meet the country's electricity needs. Indonesia's water energy potential is substantial, reaching 75,000 Megawatts (MW). However, the current utilization through the national electricity supply only amounts to 10% of its total potential (Direktorat Jenderal EBTKE, 2014a). According to data from the Ministry of Energy and Mineral Resources (ESDM), the distributed potential of water energy resources is as follows: 15,600 MW (20.8%) in Sumatra, 4,200 MW (5.6%) in Java and Kalimantan, 21,600 MW (28.8%) in Sulawesi, 10,200 MW (13.6%) in Bali, NTT, NTB, 620 MW (0.8%) in Maluku 430 MW (0.6%) and in Papua contributing to a total water energy potential of 22,350 MW or 29.8% of the national potential (Direktorat Jenderal EBTKE, 2014). The overall water energy potential of Indonesia is 75,000 MW, but the current utilization stands at a mere 10.1%, equivalent to 7,572 MW (Direktorat Jenderal EBTKE, 2014)

- Biomass

In the agricultural sector, biomass waste such as palm oil waste, coconut waste, and other agricultural residues can be utilized as a source of biomass energy. Biomass can be used for power generation, industrial heating, and bioenergy production. The biomass used as an energy source (fuel) in Indonesia generally has low economic value or consists of waste after extracting primary products. Biomass can be derived from plants, trees, grasses, tubers, agricultural waste, forest waste, sewage, and animal manure. The potential biomass resources in Indonesia are estimated to be around 49,810 MW, derived from plants and debris. The significant biomass potential for energy currently lies in plantation waste such as palm oil, coconut, and sugarcane, as well as forest residues such as sawdust and wood production waste (Hermawati et al., 2014).

- Geothermal Energy

> Indonesia has significant geothermal potential in various regions, especially Java, Sumatra, and Nusa Tenggara. Geothermal energy can be harnessed for geothermal power generation, a clean and sustainable energy source. Indonesia is located in the Ring of Fire, holding 40% of the world's geothermal reserves. According to data from the Geological Agency of the Ministry of Energy and Mineral Resources in 2020, Indonesia's total geothermal energy potential is estimated to reach 23.7 GW (Direktorat Jenderal EBTKE, 2020a). From this potential, the government has designated Geothermal Working Areas (WKP) and Preliminary Survey and Exploration Assignment Areas (WP-SPE) that are ready for development (Direktorat Jenderal EBTKE, 2020a).

Indonesia's renewable energy potential can help support a green economy that does not generate carbon dioxide emissions towards the environment and achieves net zero carbon. Implementing renewable energy in Indonesia can reduce the risk of dependence on fossil fuels, which can cause significant environmental damage and vulnerability to international price fluctuations.

2. Sustainable Agriculture

The agricultural sector strategically develops Indonesia's economy, contributing 13.70% to Indonesia's Gross Domestic Product (GDP) in 2020(Anugrah, 2022). However, this sector has been experiencing a declining contribution. The agricultural sector in Indonesia also contributes to environmental pollution due to the excessive use of pesticides and chemical fertilizers (Anugrah, 2022). Some pesticides can contaminate surface and groundwater sources. For instance, organophosphate and pyrethroid pesticides are frequently identified in rivers, lakes, and water wells at levels potentially harming aquatic organisms and humans. The extended use of specific pesticides can lead to their accumulation in the soil, which diminishes soil fertility and quality. This accumulation can disrupt plant growth and nutrient cycles. Additionally, certain pesticides can disturb soil microorganisms that play a crucial role in ecological processes and maintaining ecosystem balance (Supriatna et al., 2021).

The agricultural sector in Indonesia also has significant potential to adopt sustainable farming practices. By embracing organic farming techniques, efficient water management, and organic fertilizers, the farm sector can reduce harmful pesticides and excessive water consumption and maintain soil fertility. The development of organic farming can be a crucial component of Indonesia's green economy. Organic agriculture can preserve the environment and reduce the risk of carbon accumulation by using organic fertilizers, pesticides, and other chemicals, and the natural properties of agricultural plants that can absorb carbon dioxide. Organic farming will produce organic food, which avoids using pesticides and chemical fertilizers and can preserve soil health and product quality while adding value to agricultural products (Arista, 2021). Moreover, sustainable farming practices in Indonesia can significantly

contribute to achieving a sustainable and environmentally friendly green economy (Andri, 2022).

The role of agriculture in the economy is unquestionable. The creation of employment opportunities in various agricultural processes can help improve the welfare of society. The green economy in agriculture has great potential to provide broad benefits. Sustainable agriculture geared towards green economy principles can provide farmers and agricultural workers with better and safer job opportunities. Sustainable practices such as organic farming, crop rotation, and reduced use of pesticides and chemical fertilizers can increase land productivity and extend the harvest period. This means more stable incomes and better welfare for farming communities.

Green economy agricultural practices focusing on sustainability and crop diversity can sustainably increase food production. Crop diversification and agroforestry approaches can reduce the risk of crop failure due to natural disasters or climate change. This means that people's food security is higher, their dependence on imports is reduced, and food price stability is maintained. Sustainable agricultural practices help maintain soil fertility, preserve water quality, and reduce environmental pollution due to excessive use of chemicals. Green economy agriculture encourages the use of renewable energy and better waste management. This contributes to preserving nature and ecosystems, which is essential for long-term sustainability.

Sustainable agriculture will also create new jobs in rural areas. This will have a positive impact on the economic progress of the community. From farm laborers, agricultural product processors, and product distributors to agricultural waste managers, all these roles can be filled by people who need jobs (Kalimasada, 2022).

3. Sustainable Tourism

Indonesia has a tremendous potential for sustainable tourism. The country is rich in natural beauty, cultural diversity, and captivating historical heritage. This potential can be utilized to build environmentally friendly tourism, preserve the environment, and empower local communities (Kementerian Komunikasi dan Informatika, 2015). One of the critical assets of sustainable tourism in Indonesia is its natural wealth. The country boasts several national parks, conservation areas, mountains, and stunning beaches. With proper management, such as implementing strict measures to protect endemic flora and fauna in national parks and conservation areas, active monitoring, surveillance, and rigorous enforcement against illegal practices like poaching and timber theft, environmental sustainability can be ensured and biodiversity conserved. These places can become attractive tourist destinations for travelers seeking authentic nature experiences. Conservation and ecological preservation efforts must be a priority in developing tourism in Indonesia.

Sustainable tourism in Indonesia should also prioritize the well-being of local communities. Tourism development should

create economic opportunities for local communities by establishing accommodations, restaurants, and other micro and small businesses. Participatory and inclusive approaches must be employed in the planning and development of tourism to ensure that the sector's economic benefits are distributed fairly among local communities (Limanseto, 2022).

Currently, the Ministry of Tourism and Creative Economy is no longer solely focused on increasing tourist arrivals in Indonesia but is more focused on promoting sustainable tourism (Kemenparekraf RI, 2021). In short, sustainable tourism is the development of a tourism concept that can have long-term impacts on the environment, society, culture, and economy for the present and future of both local communities and visiting tourists (Kemenparekraf RI, 2021).

In efforts to develop sustainable tourism, four main pillars are emphasized. These include sustainable management of tourism businesses, long-term socioeconomic sustainability, the preservation and development of sustainable culture, and environmental sustainability (Kemenparekraf RI, 2021). With these four pillars as a foundation, sustainable tourism will attract many tourists. Travelers will seek leisure and adhere to tourism protocols related to health, safety, comfort, and environmental preservation (Kemenparekraf RI, 2021).

Optimizing Indonesia's potential for sustainable tourism will enable the country to build a sustainable green economy, reduce negative environmental impacts, and provide broad economic and social benefits to local communities (Kemenparekraf RI, 2023). Sustainable tourism in Indonesia is founded on the primary principle of conserving nature and culture. In addition to offering invaluable environmental and cultural values, sustainable tourism also yields noteworthy economic advantages. By generating employment and income for the local population, the sector directly contributes to alleviating poverty. Through the engagement of local communities in the management and benefits of tourism, their participation is enhanced, and welfare becomes more equitable. This encompasses employment opportunities, training, and support for small and medium enterprises, fostering positive and enduring change within local communities. The government, tourism stakeholders, and the community must collaborate in developing sustainable tourism that considers economic, environmental, and social aspects in a balanced manner (Puandria, 2023).

Green Economy Challenges in Indonesia

In practice, the green economy that Indonesia aspires to face challenges. This is a challenge because it is outside the potential and the efforts that Indonesia has made. Despite having various possibilities for implementing a green economy, Indonesia also needs help. The following are some of the challenges faced by Indonesia in its efforts to implement a green economy:

1. <u>The conventional economic paradigm in society</u>

   One of the primary challenges faced by Indonesia in implementing a green economy is the prevailing

conventional economic paradigm, as emphasized by Prof. Arief Anshory Yusuf, S.E, M.Sc., Ph.D., a Professor at the Faculty of Economics and Business, University of Padjadjaran. In the "Meet The Expert #2" at an event organized by the Microeconomics Dashboard Study Section of the Faculty of Economics and Business, Gadjah Mada University (FEB UGM), he highlighted that the conventional economic paradigm still holds strong (Nayottama, 2022). Traditional economics is based on behavior that occurs in monetary units characterized by the absence of certain boundaries (Abdullah, 2012).

Society is still firmly attached to the conventional economic paradigm. The Capital Investment Coordinating Board of Indonesia stated that there needs to be more public literacy regarding green energy (Tusin, 2022). These two realities are interconnected, as the lack of general literacy leads to limited knowledge and understanding of the community about the green economy, thereby perpetuating conventional economic thinking. This condition challenges the government, making it difficult to encourage public participation in creating a green economy when people need more knowledge about it. The limited general understanding of the green economy is likewise predicated upon the populace's diminished inclination toward engaging in reading (Tahmidaten & Krismanto, 2020).

This challenge is closely related to Indonesia's Human Resources (HR) quality, which needs to give more attention to the natural environment. Many Indonesians remain insensitive to the declining environmental conditions caused by their activities, such as burning forests for illegal land clearing and logging of trees (Hefriyenni, 2022). However, the deteriorating state of Indonesia's natural capital will significantly impact people's welfare. Public awareness of climate change is essential for achieving environmental sustainability. By raising public awareness of the negative externalities resulting from economic activities, the government can formulate and implement policies to address these issues (Bram et al., 2013).

2. Institutional Design and Government Regulation

Institutional design and government regulation challenges are difficult to solve as they involve various stakeholders. Institutions in Indonesia can be considered inefficient due to high transaction costs, asymmetric information, and overlapping regulations or policies, which hinder the green economy program (Kementerian PPN/Bappenas, 2018).

Furthermore, regulations play a central role in the development of the green economy in Indonesia, par-

ticularly in the energy transition process. Laws should serve as the foundation and legal framework for all business and other activities, providing support and certainty to all stakeholders. However, the rules issued by the Indonesian government have yet to effectively enhance the competitiveness of the Green Economy sector, resulting in continued support for environmentally unfriendly economic industries such as unsustainable energy subsidies (Global Green Growth Institute, 2015). This is because the Indonesian government is still in the transitional stage, implementing a green economy, and has yet to fully meet the demand for renewable energy (Dewan Energi Nasional, 2022).

As a result, industries and economic activities still rely heavily on fossil fuels, such as coal production and consumption, which remain Indonesia's primary energy source. Addressing this imbalance requires attention from the government and a regulatory transition from a reliance on non-renewable commodities to renewable ones (Keliat et al., 2022).

Reassessment of regulations related to the Green Economy and energy transition is crucial. In particular, mainstreaming regulations at the upstream level can accelerate the output of research and innovation in the Green Economy, such as creating indigenous green technology patents in Indonesia. Additionally, improving the quality of education should also be supported by regulations to encourage the creation of skilled workers in the Green Economy and renewable energy sector as a whole (Maximum, 2016).

Regulations that support the capacity-building of policymakers in understanding implementation issues and solutions are also essential in overcoming these regulatory challenges. Enhanced capacity for mainstreaming is expected to drive political commitment from the government and increase awareness among all stakeholders to contribute to creating high-quality green jobs and technologies in Indonesia (Keliat et al., 2022).

Regulatory uncertainty has also hindered the developing of supporting instruments for the Green Economy. For instance, the carbon tax policy needs more clarity regarding fixation, especially concerning the selection of subjects and carbon tax allocation, aligning the carbon tax with carbon emissions trading schemes, and the roadmap for carbon tax implementation. Delayed implementation of the carbon tax can result in a lack of incentives and pressure for businesses to participate in the energy transition in production processes and other economic activities. Therefore, the participation of all stakeholders, including companies, is crucial for large-scale transi-

tion steps (Makmun, 2016).

Another institutional challenge is a clear legal framework for managing a Green Economy. The draft New and Renewable Energy Law in Indonesia is currently being discussed at the legislative and executive levels so that no final decision has been made (Sekretariat Kabinet RI, 2017). This condition poses a significant challenge in the energy transition process. Completing the draft New and Renewable Energy Law becomes increasingly essential, considering that the government has implemented various technical regulations to promote energy industry development, such as regulations related to geothermal energy development, without alignment with the ongoing legislative framework. Suppose the draft New and Renewable Energy Law is passed, and the regulatory content is inconsistent with the existing regulations and the objectives of renewable energy industry development. In that case, it may lead to a resurgence of distrust and threaten the sustainability of the renewable energy industry (Sekretariat Kabinet RI, 2017).

At least three issues may require adjustments when there is a divergence in the direction of discussions between the legislative and executive branches, namely, business permits, purchase prices, and incentives. These three issues already have established regulations, including Law Number 11 of 2020 governing business permits, Presidential Regulation Number 112 of 2022 governing the purchase price of electricity from new and renewable energy by PLN, Government Regulation Number 9 of 2021, and Minister of Finance Regulation Number 188 of 2015 governing fiscal and non-fiscal incentives for businesses (Direktorat Jenderal EBTKE, 2014a). Therefore, costs will be involved when these established regulations need to be readjusted if the substance of the draft law on new and renewable energy (RUU EBT) to be passed is significantly different.

Another challenge is the level of political commitment from the government and relevant institutions in enforcing the issued regulations. Although the government has administered several rules to manage and oversee the national Green Economy, they must be supported by accountable and integrity-based supervision to ensure that the regulations do not lead to green paradox practices. Furthermore, most issued regulations only serve as guidelines without accompanying punitive measures that have a deterrent effect. Thus, enforcing violations of unsustainable economic activities cannot be optimally carried out (Asian Development Bank, 2005).

According to the World Bank, there are two reasons why In-

donesia still faces challenges in addressing environmental degradation and achieving balanced economic growth (World Bank, 2014). First, there needs to be a more substantial commitment to implementing policies that have been established to address and reduce environmental degradation. Second, there needs to be more integration in considering the environmental impacts of development planning. This indicates that institutional design deficiencies pose a challenge for the Indonesian government in addressing environmental degradation issues (Beyene & Kotosz, 2020).

3. Financing and fiscal capacity of the state

If the NZE 2045 and 2050 scenarios are chosen, it will require significant costs, exceptionally compensating for the termination of Power Purchasing Agreements. This program requires funds amounting to Rp28,223 trillion. Most of the funds necessary, amounting to Rp26,602 trillion, come from the transportation and energy sectors (Tusin, 2022).

The investment cost to build Indonesia's green economic infrastructure until 2030 reaches Rp3,799 trillion (Tusin, 2022). However, achieving this figure is challenging, considering that investments in New and Renewable Energy have not met the set targets recently. In 2020, the target investment in new renewable energy was US$2.02 billion, but only realized US$1.36 billion, or around 70%. In 2021, the government targeted new renewable energy investments of US$2.04 billion, but once again, it still needs to be achieved and only realized US$1.51 billion, or 74%. In 2022, the government increased the target investment in new renewable energy to US$3.93 billion but only realized US$0.67 billion, or 16.9%, by June 2022 (Keliat et al., 2022).

To face funding challenges, the Indonesian government is conducting promotions related to green investment. Green investment focuses on generating more excellent value for money in the future and pays attention to the environmental, social, and promising governance sectors. This is the scope of Environment, Social, and Governance (ESG) (Ramadhani, 2023). In the green growth program, Green Investment aims to create business opportunities that generate profits while being responsible for environmental mitigation (Rany et al., 2020).

To support the green growth program, adequate technology is needed to address the impacts of industrialization. Based on Schumpeter's theory and concept of innovation (1928), research and development (R&D) is a form of innovation creation that produces adequate technology to avoid the negative impacts of

industrialization (Schumpeter, 2017). Therefore, the government's role in providing accessible and affordable public services such as education and research can accelerate innovation.

Fiscal policies implemented by the Ministry of Finance, such as budget allocations, serve as tools to stabilize and promote economic growth by providing facilities to the public. With the principle of Value for Money, the planning and budgeting conducted by the government aim to achieve three essential elements: efficiency, effectiveness, and economic growth. In this regard, planning and budget utilization should yield the desired results and impacts, ensuring that financial budgets are used efficiently (BKF Kemenkeu, 2018).

4. The risk of stranded assets

Indonesia faces significant stranded asset risks in the implementation of a green economy. These risks are associated with assets operating in conventional patterns, such as fossil fuel-based power plants, fossil fuel-based transportation infrastructure, and other industrial sectors that still rely on non-renewable energy sources (Institute for Essential Services Reform (IESR), 2021).

In the transition to a green economy, these assets have the potential to become valueless or obsolete as they need to align with the new paradigm that prioritizes renewable and sustainable energy sources. Policy and regulatory changes that support greenhouse gas emission reduction and environmental protection can result in decreased demand or a decline in the value of these assets (Keliat et al., 2022).

For example, with the policy to cease the operation of fossil fuel power plants, these power plants can become stranded assets if no appropriate measures are taken to repurpose them within the context of renewable energy. The same applies to fossil fuel-based motor vehicles in the transportation industry (Makower & Pike, 2008).

To mitigate stranded asset risks, careful planning is required to transition to a green economy, including effective management of affected assets. The government needs to implement policies that encourage the conversion of these assets into forms that align with the green economy, such as repurposing fossil fuel power plants into renewable energy power plants or replacing conventional transportation fleets with environmentally friendly vehicles (Maximum, 2016). Collaboration between the government, private sector, and society is necessary to identify stranded asset risks, find innovative solutions, and develop sustainable business models. These steps will help reduce risks and maximize opportunities in the transition to a sustainable green economy

(Badan Riset dan Inovasi Nasional, 2022).

Careful preparation is required in energy transition strategies, including how the government manages "brown assets" that have been built and have the potential to become stranded assets. One of the steps is through Presidential Regulation Number 12 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply. The government will retire Coal-Fired Power Plants (PLTU) through this regulation. Article 3, paragraph 1 states that the Minister is responsible for developing a roadmap to accelerate the cessation of PLTU operations. The roadmap includes reducing greenhouse gas emissions from PLTUs, accelerating the demise of PLTU operations, and aligning with other policies (Daryono, 2022).

Indonesia's Efforts to Achieve Net-Zero Emissions Through a Green Economy

The Indonesian government has engaged in several collaborative partnerships to achieve net zero Emissions. Achieving net zero emissions is one of realizing global goals, so collaboration between state, non-state, and private actors is needed. These collaborations involve various ministries of the Republic of Indonesia, domestic stakeholders, and international actors. Here are some of the collaborations initiated by the Indonesian government with different parties that affected the realize Net-Zero Emissions:

Cooperation with the Coordinating Ministry for Economic Affairs of the Republic of Indonesia

Minister of Economic Affairs Airlangga Hartarto, in his interview in January 2023, revealed that the Indonesian government had increased the target for the composition of New and Renewable Energy (NRE) in the energy mix to 23% by 2025 and 31% by 2050 (Kementerian Koordinator Bidang Perekonomian, 2023). The Indonesian Government and the Coordinating Ministry for Economic Affairs are working to harness the potential of NRE sources.

The potential sources of NRE are scattered throughout Indonesia. For example, the Green Industrial Park in North Kalimantan utilizes energy from the Kayan River. The estimated hydroelectric potential of the Kayan River is around 11-13 gigawatts. In addition, Indonesia also has significant geothermal potential. The geothermal potential in Indonesia is one of the largest in the world, with hundreds of locations spread across the country (Direktorat Jenderal EBTKE, 2020b). According to the Ministry of Energy and Mineral Resources, Indonesia's geothermal potential is approximately 23.4 gigawatts, with the installed capacity of Geothermal Power Plants (PLTP) reaching 2.3 gigawatts (Kementerian ESDM, 2018). This geothermal potential makes Indonesia the world's second-largest user of geothermal energy after the United States (Pertamina, 2023).

Geothermal energy utilization aligns with one of the principles of the Bali Compact agreed upon during the Indonesian G20

Presidency in 2022, which emphasizes diversifying energy systems and reducing emissions from all energy sources. To observe the energy transition firsthand in Indonesia, Assistant Deputy of Multilateral Economic Cooperation at the Coordinating Ministry for Economic Affairs, Ferry Ardiyanto, as the Co-Sous Sherpa for G20 Indonesia, along with the G20 Sherpa Secretariat Team at the Coordinating Ministry for Economic Affairs, visited a geothermal power plant unit in Dieng, Central Java, operated by PT Geo Dipa Energi (GDE). PT Geo Dipa explores and exploits geothermal energy for electricity generation, contributing to the distribution of electricity produced by GDE's Geothermal Power Plants.

Collaboration with the Ministry of Finance

The Ministry of Finance, particularly the Fiscal Policy Office (BKF), has developed, evaluated, and implemented fiscal policies and funding instruments that contribute to Indonesia's efforts in climate control through the net-zero emission program (Fiscal Policy Office, 2009). The Fiscal Policy Office with the World Bank, the Australian Government, Japan, and Germany has produced several reports on strategic options to address mitigation issues in various sectors (Makmun, 2016).

The Fiscal Policy Office has also partnered with the Japan International Cooperation Agency (JICA). This partnership includes researching fiscal and non-fiscal incentives to accelerate geothermal energy development. Furthermore, BKF has implemented several fiscal policies to support the green economy, including 1) policies to promote geothermal and renewable energy, 2) policies to improve forest yields and access REDD carbon, 3) fiscal policies and income issues in the forestry sector, and 4) regional forestry incentive mechanisms (Rustam et al., 2023).

Active and collaborating in international forums

Indonesia is one of the countries that has ratified the Paris Agreement, an international agreement aimed at addressing climate change. Through the Paris Agreement, Indonesia is committed to reducing greenhouse gas emissions and taking necessary adaptation measures.

As a member of the Association of Southeast Asian Nations (ASEAN), Indonesia is also involved in collaborative efforts with ASEAN countries to reduce emissions and address climate change. Through the ASEAN Working Group on Climate Change (AWGCC), Indonesia shares experiences, knowledge, and technology with other ASEAN countries. Fabby Tumiwa, Executive Director of the Institute of Essential Services Reform, said that utilizing its leadership in ASEAN, Indonesia can encourage and embrace civil society organizations in ASEAN to focus on the energy transition, as well as initiate concrete collaborations and together can contribute to accelerating the energy transition in place and tackling climate change (Institute for Essential Services Reform (IESR), 2021).

Furthermore, Indonesia also participates in the United Nations Climate Change

Conference (COP) held annually. Through COP, Indonesia can interact with other countries, share experiences, and strengthen collective commitments to reduce emissions and address climate change. On the other hand, Indonesia is also involved in the Partnership for Market Readiness, a global initiative to accelerate and strengthen emission reduction efforts in relevant sectors, including energy, transportation, and industry. Through PMR, Indonesia receives technical and financial support for implementing climate change policies.

Indonesia is also involved in the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative, which aims to reduce deforestation and forest degradation emissions. Through REDD+, Indonesia collaborates with other countries and receives financial and technical support to protect forests and manage natural resources sustainably.

Make Indonesian domestic policy.

The Indonesian government formulates and implements national policies to reduce greenhouse gas (GHG) emissions and promote the transition to clean energy. The National Action Plan on Greenhouse Gas Emission Reduction is one of the implemented policies that cover various sectors such as industry, agriculture, energy, transportation, and others (JDIH Bappenas, 2011).

The Indonesian government has also increased its commitment to achieving the Nationally Determined Contribution (NDC) by 2030, with a target of reducing emissions by 31.89% (previously 29%) unconditionally and 43.20% (once 41%) conditionally as of September 23, 2022. With various government programs and investments, it is hoped that Indonesia will have the opportunity to achieve the net-zero emissions target by 2060 or earlier, in line with the Paris Agreement (Gembira et al., 2019). All forms of collaboration are crucial in accelerating Indonesia's efforts to achieve the net-zero emission target and address climate change globally.

Conclusion

There are substantial potential and several challenges in implementing a green economy to achieve net zero emissions and tackle the climate crisis. Based on the above explanation, Indonesia does have abundant resources that have the potential to implement a green economy. These resources include renewable energy, sustainable agriculture, and sustainable tourism. However, it is essential to note that Indonesia also faces complex obstacles in addition to having potential. These obstacles include the conventional economic paradigm in society, institutional design and government regulation, financing and fiscal capacity of the state, and the risk of stranded assets.

In addition, the Indonesian government has made several efforts to achieve net zero emissions through a green economy. The government of Indonesia has cooperated with the Coordinating Ministry for Economic Affairs of the Republic of Indonesia, collaborated with the Ministry of Finance, actively participated and collaborated in international forums, and formulated domestic policies. However, these efforts by the Indo-

nesian government have yet to yield significant results in achieving net zero emissions.

References

Books

Bram, D., Muhajur, M., & Setiawati, M. (2013). *Dinamika wacana perubahan iklim dan keterkaitannya dengan hukum dan tenurial di Indonesia: sebuah kajian kepustakaan.* Epistema Institute.

Fiscal Policy Office. (2009). *Climate Change & Fiscal Policy Issue*. Initiatives.

Gembira, H., Puspita, H. I., Utomo, E. T., Sekar, H., Paputungan, M. S., & Safitri, R. (2019). *Laporan Implementas : Perencanaan Pembangunan Rendah Karbon.*

Global Green Growth Institute. (2015). *Mewujudkan Pertumbuhan Ekonomi Hijau untuk Indonesia yang Sejahtera.*

Makower, J., & Pike, C. (2008). *Strategies for the Green Economy: Opportunities and Challenges in The New World of Business.* McGraw-Hill Education.

Schumpeter, J. A. (2017). *The Theory of Economic Development.* Taylor & Francis.

Thesis/Dissertation

Hefriyenni, R. (2022). Tinjauan Kriminologis Pembukaan Lahan Dengan Cara Dibakar Di Wilayah Hukum Pengadilan Negeri Pasir Pengaraian.

Journal article (retrieved online, with DOI)

Abdullah, M. (2012). Perbedaan Paradigma Ekonomi Konvensional dan Ekonomi Islam Dalam Teori dan Realita. *Jurnal Studi Ekonomi, 3*(1). http://dx.doi.org/10.18592/taradhi.v3i1.576

Aprilianto, R. A., & Ariefianto, R. M. (2021). Peluang dan Tantangan Menuju Net Zero Emission (NZE) Menggunakan Variable Renewable Energy (VRE) pada Sistem Ketenagalistrikan di Indonesia. *Jurnal Multidisipliner Mahasiswa Pascasarjana, 2*(2). https://doi.org/https://doi.org/10.22146/jpmmpi.v2i2.70198

Demissew Beyene, S., & Kotosz, B. (2020). Testing the environmental Kuznets curve hypothesis: an empirical study for East African countries. *International Journal of Environmental Studies, 77*(4), 636–654. https://doi.org/10.1080/00207233.2019.1695445

Dianjaya, A. R., & Epira, P. (2020). Indonesia Green Economy Implementation Readiness of Greenhouse Gas Emissions Reduction. *Journal of Contemporary Governance and Public Policy, 1*(1), 27–40. https://doi.org/10.46507/jcgpp.v1i1.5

Makmun, M. (2016). Green Economy: Konsep, Impelentasi dan Peran Kementerian Keuangan. *Jurnal Ekonomi Dan Pembangunan*, *19*(2), 1-15. https://doi.org/10.14203/JEP.19.2.2011.1-15

Martawardana, B., Rakatama, A., Junifta, D. Y., & Maharani, D. A. (2022). Green economy post COVID-19: insights from Indonesia. *Development in Practice, 32*(1). https://doi.org/10.1080/09614524.2021.2002817

Rany, A. P., Farhani, S. A., Nurina, V. R., & Pimada, L. M. (2020). Tantangan Indonesia Dalam Mewujudkan Pertumbuhan Ekonomi yang Kuat dan Pembangunan Ekonomi Berkelanjutan Melalui Indonesia Green Growth Program Oleh Bappenas. *Jurnal Ilmu Ekonomi dan Pembangunan, 20*(1). https://doi.org/10.20961/jiep.v20i1.38229

Rustam, I., Sabilla Kinanti Rizsa, & Anam, S. (2023). Climate Change Adaptation Assistance to a Number of Environmental Communities in Mataram City in Supporting NTB's Commitment to Net Zero Emission. *Jurnal Pemberdayaan Masyarakat, 2*(1). https://doi.org/https://doi.org/10.55381/jpm.v2i1.88

Supriatna, S., Siahaan, S., & Restiaty, I.

(2021). Pencemaran Tanah Oleh Pestisida Di Perkebunan Sayur Kelurahan Eka Jaya Kecamatan Jambi Selatan Kota Jambi (Studi Keberadaan Jamur Makroza dan Cacing Tanah). *Jurnal Ilmiah Universitas Batanghari Jambi, 21*(1), 460. https://doi.org/10.33087/jiubj.v21i1.1348

Tahmidaten, L., & Krismanto, W. (2020). ermasalahan Budaya Membaca di INdonesia (Studi Pustaka Tentang Problematika & Solusinya). *Jurnal Pendidikan Dan Kebudayaan, 10*(1). https://doi.org/10.24246/j.js.2020.v10.i1.p22-33

Journal Article (retrieved online, without DOI or page numbers)

Maran, M. (2017). Green Economy: Challenges And Opportunities. *Eco Forum, 6*(3). Retrieved from https://econpapers.repec.org/article/scmecofrm/v_3a6_3ay_3a2017_3ai_3a3_3ap_3a2.htm

Electronic source

Andri, K. B. (2022, September 3). Peta Jalan Green Agriculture. Tempo Majala Berita Mingguan. Retrieved from https://majalah.tempo.co/read/info-tempo/166862/peta-jalan-green-agriculture

Anugrah, D. F. (2022, September 23). Penggunaan Produk Eco-label Untuk Mendukung Ekonomi Hijau. BI Institute. Retrieved from https://www.bi.go.id/id/bi-institute/BI-Epsilon/Pages/Penggunaan-Produk-Eco-label-Untuk-Mendukung-Ekonomi-Hijau.aspx

Arifah, J. R. (2022, September 8). Degradasi Lingkungan: Pengertian, Penyebab, Dampak, Bentuk dan Cara Mengatasinya (2022). Lindungihutan. Retrieved from https://lindungihutan.com/blog/pengertian-degradasi-lingkungan/

Arista, A. C. (2021, October 29). Mengenal Pertanian Organik dan Potensinya di Indonesia. Neurafarm. Retrieved from https://www.neurafarm.com/blog/InfoTania/Budidaya%20Tanaman/mengenal-pertanian-organik-dan-potensinya-di-indonesia

Asian Development Bank. (2005). Indonesia : Country Environmental Analysis. Retrieved from https://www.adb.org/documents/country-environmental-analysis-indonesia

Badan Pusat Statistik. (2021). Ekonomi Indonesia 2020 Turun sebesar 2,07 Persen (c-to-c) UNDUH BRS INI. Retrieved from https://www.bps.go.id/pressrelease/2021/02/05/1811/ekonomi-indonesia-2020-turun-sebesar-2-07-persen--c-to-c-.html

Badan Riset dan Inovasi Nasional. (2022a, October 23). Indonesia Targetkan Pencapain Net-Zero Emission Pada 2060. Badan Riset Dan Inovasi Nasional. Retrieved from https://www.brin.go.id/news/110603/indonesia-targetkan-pencapain-net-zero-emission-pada-2060

Badan Riset dan Inovasi Nasional. (2022b, October 23). Indonesia Targetkan Pencapain Net-Zero Emission Pada 2060. Badan Riset Dan Inovasi Nasional. Retrieved from https://www.brin.go.id/news/110603/indonesia-targetkan-pencapain-net-zero-emission-pada-2060

BKF Kemenkeu. (2018). Tunjukkan Komitmen Serius Terhadap Lingkungan, OECD dan Pemerintah Indonesia Luncurkan Tinjauan Kebijakan Pertumbuhan HIjau. Retrieved from https://fiskal.kemenkeu.go.id/dw-konten-view.asp?id=2019071513075052

Daryono, A. M. (2022a, May 23). Sudah Sejauh Mana Penerapan Green Economy di Indonesia? ALAMI. Retrieved from https://alamisharia.co.id/blogs/green-economy-di-indonesia/

Dewan Energi Nasional. (2022). Outlook

Energi Indonesia 2022. Retrieved from https://den.go.id/index.php/publikasi/documentread?doc=Buku_Energi_Outlook_2022_Versi_Bhs_Indonesia.pdf

Direktorat Jenderal EBTKE. (2014). Kebijakan Pengembangan Tenaga Air. Retrieved from https://ebtke.esdm.go.id/post/2014/07/02/628/kebijakan.pengembangantenagaair

Direktorat Jenderal EBTKE. (2020). Sektor Panas Bumi. Retrieved from https://ebtke.esdm.go.id/lintas/id/investasi-ebtke/sektor-panas-bumi/potensi

Direktorat Jenderal EBTKE. (2021). SIARAN PERS : Indonesia Kaya Energi Surya, Pemanfaatan Listrik Tenaga Surya oleh Masyarakat Tidak Boleh Ditunda. Retrieved from https://ebtke.esdm.go.id/post/2021/09/02/2952/indonesia.kaya.energi.surya.pemanfaatan.listrik.tenaga.surya.oleh.masyarakat.tidak.boleh.ditunda

European Commission. (2022). Climate change and environmental degradation. Retrieved from https://knowledge4policy.ec.europa.eu/climate-change-environmental-degradation_en

Ferzi, N. (2021, December 20). Potensi Ekonomi Hijau di Indonesia. Jamberita.Com. Retrieved from https://jamberita.com/read/2021/12/30/5971550/potensi-ekonomi-hijau-di-indonesia/

Hermawati, W., Mahmudin, Rosaira, I. M. I., & Alamsyah, P. (2014). Sumber Daya Biomassa Potensi Energi Indonesia Yang Terabaikan. Retrieved from http://lipi.go.id/publikasi/sumber-daya-biomassa-potensi-energi-indonesia-yang-terabaikan/16374

Indonesia Research Institution Decarbonization. (2022). Mengenal Net Zero Emission. Indonesia Research Institution Decarbonization. Retrieved from https://irid.or.id/wp-content/uploads/2022/07/2022.04.01-Dasar-Dasar-Net-Zero-Emission_SPREADS.pdf

Institute for Essential Services Reform (IESR). (2021). Pembangunan Rendah Karbon Indonesia dan Net-Zero Emission Menuju Ekonomi Hijau. Retrieved from https://iesr.or.id/wp-content/uploads/2021/05/Final-Dir-LH-IESR-Net-Zero-Emission_V1.pdf

JDIH Bappenas. (2011). Peraturan Presiden Nomor 61 Tahun 2011 tentang Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca. Retrieved from https://jdih.bappenas.go.id/peraturan/detailperaturan/158

Julismin. (2013). DAMPAK DAN PERUBAHAN IKLIM DI INDONESIA. Retrieved from https://doi.org/https://doi.org/10.24114/jg.v5i1.8083

Kalimasada, B. (2022, January 4). Pertanian yang Menghijaukan Perekonomian Indonesia. AMF. Retrieved from https://amf.or.id/pertanian-yang-menghijaukan-perekonomian-indonesia/

Keliat, M., Hirawan, F. B., Lestari, I., Farizi, O., Xu, N., Noor, R., Fauzi, S., Arreta, J., Daulay, N., Fariz, D., & Marzuki, R. (2022). Ekonomi Hijau dalam Visi Indonesia 2045. Retrieved from https://www.csis.or.id/publication/ekonomi-hijau-dalam-visi-indonesia-2045/

Kemenkeu RI. (2022). Ini Komitmen Indonesia Mencapai Net Zero Emission. Retrieved from https://www.kemenkeu.go.id/informasi-publik/publikasi/berita-utama/Ini-Komitmen-Indonesia-Mencapai-Net-Zero-Emission

Kemenparekraf RI. (2021). Destinasi Wisata Berbasis Sustainable Tourism di Indonesia. Retrieved from https://kemenparekraf.go.id/ragam-pariwisata/Destinasi-Wisata-Berbasis-Sustainable-Tourism-di-Indonesia

Kemenparekraf RI. (2023). Gerakan “Kita

Mulai Sekarang": Upaya Mendukung Sustainable Tourism. Retrieved from https://kemenparekraf.go.id/kebijakan/gerakan-kita-mulai-sekarang-upaya-mendukung-sustainable-tourism

Kementerian ESDM. (2018). Ini Dia Sebaran Pembangkit Listrik Panas Bumi di Indonesia. Retrieved from https://www.esdm.go.id/id/media-center/arsip-berita/ini-dia-sebaran-pembangkit-listrik-panas-bumi-di-indonesia

Kementerian Komunikasi dan Informatika. (2015). Saatnya Kembangkan Potensi Pariwisata Indonesia. Retrieved from https://www.kominfo.go.id/content/detail/5640/saatnya-kembangkan-potensi-pariwisata-indonesia/0/infografis

Kementerian Koordinator Bidang Perekonomian. (2023). Pemerintah Terus Mendorong Percepatan Transisi Energi di Dalam Negeri Guna Mencapai Target Net Zero Emission pada 2060. Retrieved from https://www.ekon.go.id/publikasi/detail/4996/pemerintah-terus-mendorong-percepatan-transisi-energi-di-dalam-negeri-guna-mencapai-target-net-zero-emission-pada-2060

Kementerian PPN/Bappenas. (2018). Laporan Kajian; Background Study RPJMN 2020-2024. Retrieved from http://aparatur.bappenas.go.id/assets/img/3_%20Laporan%20Kajian%20Background%20Study%20RPJMN%202020-2024%20Bidang%20Aparatur%20Negara%20-%202018.pdf

Khor, M. (2013). Challenges of the Green Economy Concept and Policies in the Context of Sustainable Development, Poverty and Equity. Retrieved from http://purochioe.rrojasdatabank.info/transition-4.pdf

Laily, I. N. (2022). Energi Alternatif adalah Pengganti Bahan Bakar Fosil, Ini Contohnya. Retrieved from https://katadata.co.id/safrezi/berita/61e130d2ccaae/energi-alternatif-adalah-pengganti-bahan-bakar-fosil-ini-contohnya

Limanseto, H. (2022a). Green Economy Mendorong Terciptanya Pembangunan Ekonomi yang Inklusif dan Berkelanjutan. Retrieved from https://ekon.go.id/publikasi/detail/4024/green-economy-mendorong-terciptanya-pembangunan-ekonomi-yang-inklusif-dan-berkelanjutan

Limanseto, H. (2022b). Kembangkan Pariwisata Berkelanjutan, Menko Airlangga Dorong Upaya Melestarikan Warisan Budaya. Retrieved from https://ekon.go.id/publikasi/detail/4465/kembangkan-pariwisata-berkelanjutan-menko-airlangga-dorong-upaya-melestarikan-warisan-budaya

Nayottama, H. (2022). Retrieved from Mengupas Tuntas Peluang dan Tantangan Ekonomi Hijau. https://feb.ugm.ac.id/id/berita/3721-mengupas-tuntas-peluang-dan-tantangan-ekonomi-hijau

Pertamin. (2023, March 21). Sambut Prospek Cerah Pengembangan Panas Bumi, PGE Punya Fundamental Keuangan Kuat. Pertamina. Pertamina. Retrieved from https://www.pertamina.com/id/news-room/news-release/sambut-prospek-cerah-pengembangan-panas-bumi-pge-punya-fundamental-keuangan-kuat

Pristiadaru, D. L. (2023, June 28). Potensi Energi Angin di Indonesia, Tersebar Luas di Berbagai Wilayah. Kompas. Retrieved from https://lestari.kompas.com/read/2023/05/10/100302486/potensi-energi-angin-di-indonesia-tersebar-luas-di-berbagai-wilayah

Puandria. (2023). Mengenal Lebih Dekat Potensi Ekowisata di Indonesia. Retrieved from https://phinemo.com/mengenal-lebih-dekat-potensi-ekowisata-di-indonesia/

Ramadhani, N. (2023, April 2). Investasi

Berkelanjutan dan Dampak Positif Bagi Lingkungan. Akseleran. Retrieved from https://www.akseleran.co.id/blog/investasi-berkelanjutan/

Sekretariat Kabinet RI. (2017). Potensi Pengembangan PLTB di Indonesia. Sekretariat Kabinet Republik Indonesia. Retrieved from https://setkab.go.id/potensi-pengembangan-pltb-di-indonesia/

Skha. (2022, November 8). Mengintip Potensi Green Economy di Indonesia dan Kebijakannya. Skha. Retrieved from https://skha.co.id/id/artikel/sektor-publik/energi-utilitas-pertambangan/potensi-green-economy-dan-kebijakannya-di-indonesia/

Tusin, U. (2022, November 15). Penerapan Green Economy di Indonesia: Tantangan dan Perkembangan. LandX. Retrieved from https://landx.id/blog/penerapan-green-economy-di-indonesia-tantangan-dan-perkembangan/

UNEP. (2013). Green Economy and Trade - Trends, Challenges and Opportunities. UNEP. Retrieved from https://www.unep.org/resources/report/green-economy-and-trade-trends-challenges-and-opportunities

United Nations. (2015). Climate Change. Retrieved from https://www.un.org/en/global-issues/climate-change

waste4change. (2022, August 29). Net Zero Emission Indonesia 2060: Langkah Menuju Ekonomi Sirkular. . Waste4change.Com. Retrieved from https://waste4change.com/blog/net-zero-emission-indonesia-2060-menuju-ekonomi-sirkular/

World Bank. (2014). Bank Dunia dan lingkungan di Indonesia. Retrieved from https://www.worldbank.org/in/country/indonesia/brief/world-bank-and-environment-in-indonesia

Yulianti, A. (2015). Ekonomi Hijau (Green Economy) Untuk Mendukung Pembangunan Berkelanjutan di Provinsi Kepulauan Bangka Belitung. Retrieved from https://bappeda.babelprov.go.id/content/ekonomi-hijau-green-economy-untuk-mendukung-pembangunan-berkelanjutan-di-provinsi-kepulauan

Yusuf. (2021). Potensi Besar Indonesia pada Ekonomi Hijau dan Digital. Retrieved from https://www.kominfo.go.id/content/detail/38192/potensi-besar-indonesia-pada-ekonomi-hijau-dan-digital/0/berita